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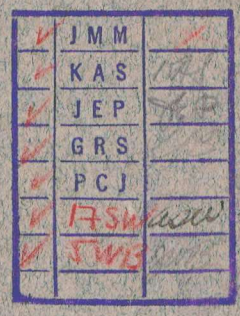
FOREST INSECT INVESTIGATIONS

FOREST INSECT SURVEYS

LASSEN NATIONAL FOREST, CALIFORNIA

Season of 1935



by

Philip C. Johnson
Berkeley, California
December 1, 1935

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Forest Insect Laboratory
Berkeley, California
December 1, 1935

FOREST INSECT SURVEYS

LASSEN NATIONAL FOREST,

CALIFORNIA

Season of 1935

Approved by:

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FOREST INSECT SURVEYS - LASSEN NATIONAL FOREST, CALIFORNIA

Season of 1935

by

Philip C. Johnson

INTRODUCTION

The 1935 regional survey of the eastern Lassen National Forest was conducted by the Bureau of Entomology and Plant Quarantine from September 13 to 23. A lack of funds restricted the intensive sampling to about one-half of the number of permanent plots on the area. Accordingly, a large portion of the eastern Lassen was left to be covered by reconnaissance type of survey. This curtailment is to be regretted in some respects because of the necessity of substituting extensive methods for the intensive plot method of sampling. Extensive survey methods are valuable in supporting loss estimates based upon sample plots, but when used alone are inadequate for accurate estimation of insect losses. The omission of sample plots in any year also results in an interruption of the continuity of a loss record on a given area. These records have proven of great value in studying many phases of barkbeetle infestations.

The plots cruised in 1935 sampled areas in which recent insect control programs and salvage logging operations have occurred. In addition, intensive survey methods were applied to the Blacks Mountain Experimental Forest and the Fruit Growers Supply Company sale area because of the management policies involved. It has been necessary to apply the 1935 plot loss figures over a larger area and to rely upon general observations to a greater extent than is desirable. Although the accuracy of the loss estimates is impaired it is believed that they are indicative of the general infestation conditions.

GENERAL INFESTATION CONDITIONS

Characteristics:

On the whole, 1935 loss figures for the area covered by the survey have disclosed a decrease, both as to the number of trees and the volume infested. The volume of the average infested tree which was 959 B.M. in 1934 decreased to 862 B.M. in 1935. This is attributed to the large number of smaller trees involved in the summer group killings. The grouping of infested trees, together with a decrease in the volume of the average tree, is considered to indicate the peak of an infestation cycle. Grouping, as shown by Figure 1, occurred principally in ponderosa pine, and to a less extent in Jeffrey pine. In ponderosa pine it resulted from the attacks of the second seasonal generation of the western pine beetle, Dendroctonus brevicomis Lec., the attack period of which occurred from the middle to the end of August. It is believed that the peak of the loss cycle was reached in mid-summer and that a decrease in the over-wintering beetle population is to be expected.

The 1935 infestation showed a reduction in the fringe type pine stands extending from the north slopes of Hlacks Mountain east and south to Eagle Lake. The loss for the units involved is given in Table I. The reduction in these units ranged from 46 to 62 percent of the 1934 figures.

The remainder of the area included by the survey, most of which carries stands of a better type, showed an increase in the 1935 infestation with the exception of the Harvey Mountain and Cone Mountain units. Insect control and salvage cuttings have been carried on in these two units in the past year and reductions in the 1935 loss amounted to 29 and 34 percent respectively. Increases for 1935 approximated 14 percent in the Crater Mountain Unit, 13 percent in the Bogard Unit, 12 percent in the Butte Creek Unit, and 81 percent in the Willow Spring Unit. Heavier infestations, together with the epidemic characteristics mentioned above, have usually been found to occur about one year later in the better site classes than in the poorer fringe type. This may explain, in part at least, the fact that a peak in the infestation cycle was reached in the fringe area along the north and east boundaries of the Lassen National Forest during 1934, while the same conditions occurred in the better stands to the south and west of the fringe in 1935.

The estimated total seasonal loss for 1935 on each of the plots covered by the survey is given in Table II. Since several of the plots were not cruised this year, some difficulty was experienced in arriving at a definite loss figure on several of the units. The estimated loss per unit is shown in Table III.

A summary of the volume loss per acre for the last three years of all units covered by the regional survey on the Lassen National Forest is given below:

TABLE I

Unit	B. M. Loss Per Acre		
	1933	1934	1935
Willow Spring	265	279	537
Dixie Valley	535	548	253
Slate Mtn.	231	309	302
Gordon Creek	173	133	80
Cave Mtn.	127	204	138
Brockman Flat	100	260	189
Logan Mtn.	Cutover - No Estimates		
Crater Mtn.	92	168	191
Harvey Mtn.	195	486	345
Cone Mtn.	225	336	221
Bogard	106	144	163
Butte Creek	109	122	138
Average	173	277	214

Composition:

Infestation trends in both Jeffrey and ponderosa pine have closely paralleled each other in spite of the fact that the insect species

attacking each host are different. The western pine beetle has continued the increase in activity that was begun in 1934, and in 1935 is the chief species concerned in the infestation of ponderosa pine. The composition of infestation in the average Jeffrey pine involves three major species of barkbeetles: the Jeffrey pine beetle, Dendroctonus jeffreyi Hopk., a flat-head borer, Melanophila californica Van D., and an Ips beetle, Ips emarginatus Lec.

Seasonal History:

Seasonal history studies carried on at Hackamore, California, indicated that the western pine beetle infestation this year was the result of activity by two complete and a partial third generation, the first two primarily summer broods and the latter an over-wintering brood. Though this information applied directly to the Modoc area, the survey indicated that approximately the same number of generations developed in the eastern Lassen National Forest during 1935.

Losses in White Fir:

The regional survey is primarily concerned with losses in merchantable pine timber caused by barkbeetles. However, the losses in white fir from insects has become important enough to warrant mention in this report. The dead and dying white fir is particularly noticeable to anyone traversing areas in which this species is present in any large amount in the stand. This loss appears to prevail in most of the fir types in eastern Lassen areas. Much of the loss occurs as topkilling, though many trees are completely infested. The fir engraver beetle, Scolytus ventralis Lec., is largely responsible for both types of injury and is one of the most important insect enemies of white fir in California.

EFFECTS OF THE 1934-35 INSECT CONTROL PROGRAM

The 1935 infestation has decreased approximately 81 percent in the areas covered by the Blacks Mountain unit of the 1934-35 Halls Flat Insect Control Project. On Harvey Mountain, at the east end of the treated area, the effect was not as great and the reduction in 1935 losses amounted to only 42 percent or about half that on the greater portion of the treated area. The area immediately south and west of the control boundaries suffered an increase of about 8 percent over 1934 figures. The east half of the Blacks Mountain Experimental Forest, which was included in the control project, has an estimated 1935 per section loss of 77 trees with a volume of 59,170 B. M. The untreated portion of the experimental forest suffered an estimated loss of 202 trees, or 183,870 board feet per section.

The Little Valley Unit of the above control project apparently effected a reduction in losses for 1935. This conclusion is based on general observations, as lack of time and funds prevented any accurate determinations.

The full effect of the control work in these two units will not be evident until several more barkbeetle generations have developed.

SALVAGE CUTTING

The Fruit Growers Supply Company, cooperating with the Forest Service and the Bureau of Entomology and Plant Quarantine, carried on an experimental salvage logging operating during the 1935 season. The purpose of this work was to determine the feasibility of logging and manufacturing merchantable insect-killed timber under existing conditions. The Bureau, interested in the entomological phases of the program, established a 320 acre sample plot on the areas. This plot (L-15) was cruised late in June at the time the infested timber was cut. Another cruise was made in September. This latter cruise showed that only 22 percent of the total estimated loss for 1935 occurred between July 1 and September 1. On other areas outside the salvage zone the bulk of the 1935 losses occurred during that period. While it is too early to draw any definite conclusions, there are indications that the salvage work and the removal of the infested logs from the woods may result in a decrease in the subsequent losses.

INFESTATION CONDITIONS IN OTHER LASSEN AREAS

The only other area examined outside those usually covered by the regional survey was that of privately-owned timber south of Eagle Lake. A reconnaissance of this area in August showed many large groups of trees infested by 1935 summer broods of the western pine beetle. The loss was estimated at 350 trees per section. This flare-up is a continuation of heavy 1934 losses in the same stand. From all indications, the peak of the epidemic was reached during the summer of 1935 and a reduction in the overwintering brood is expected.

INSECT CONTROL POSSIBILITIES

An examination made in the Modoc area late in October, 1935 indicated a decline in the over-wintering barkbeetle population. A decrease in the infestation for the coming year should result. The survey of the Lassen disclosed similar tendencies. Unless a marked reduction in losses occurs, the infestation in many parts of the Lassen would still be heavy enough to justify some regulatory action being taken against barkbeetle activity.

This action may take the form of direct control measures. While they appear to have been successful in the Lassen area in the past, the project areas would necessarily have to be large. There is also the probability that direct control would have to be repeated in maintenance projects if present critical environmental conditions continue.

Conditions on the Lassen National Forest are ideal for the use of indirect methods of control. These methods include changes in management plans due to consideration of insect control loss and salvage of infested material. A study of losses in cutover lands made in 1934 and subsequent examinations in 1935 revealed a very low loss per acre in the pine reserve. Adjacent uncut areas of similar types were harboring epidemic infestations. In regulation of losses through cutting practice a relatively light cut with a reduced cutting cycle on better sites varying to heavy cuts leaving little reserve on poor sites may have a profound effect upon barkbeetle depredations.

Salvage of infested material may be called for when a relatively high normal infestation is present and the utilization of the stand is delayed. This condition now exists on some of the better sites on the Lassen, where a loss of nearly 5 percent of the stand has occurred since 1933. Salvage may also be used to good advantage in conjunction with fairly short cutting cycles which leave a large reserve.

The above indirect methods are still in the experimental stage and their development in the areas is to be encouraged. They appear to be a solution for a situation difficult to handle satisfactorily by more direct means.

TABLE II

PLOT LOSSES

Lassen National Forest

PER SECTION BASIS

Plot:	1933			1934				1935 (Estimated)			
No.	Trees	Volume B.M.	B.M. per Acre	Trees	Volume B.M.	B.M. per Acre	% 1933 Infestation	Trees	Volume B.M.	B.M. per Acre	% 1934 Infestation
L-1	114	121,700	190	154	169,320	265	139	202	183,370	287	108
L-2	100	171,140	267	312	307,960	481	180	77*	59,170	92	19
L-3	138	155,650	244	220	253,300	396	162	163**	146,490	228	58
L-4				COUNT: 1 N: 1 9			4				
L-5	66	67,920	106	110	108,140	169	159	149	122,400	191	113
L-6	144	76,600	120								
L-7	92	90,820	141	114	86,160	135	96	166	64,240	100	75
L-8	214	206,030	322	*							
L-9	246	177,020	277	*							
L-10	128	64,060	100	*							
L-11	60	103,020	161	*							
L-12	32	70,340	110	*							
L-13	102	143,840	225	84	78,500	123	55	140	68,170	107	87
L-14	206	228,380	357	422	468,340	732	205	311	227,800	356	48
L-15				248	368,960	577		211***	255,230	399	69
Average	133	138,920	202	208	229,960	359	178	177	141,116	221	82

* Not cruised 1935. Losses for 1934 incomplete

** Plot included in Halls Flat Control Project of 1934-35

***Plot included in Fruit Growers Supply Company salvage logging operation of summer 1935

TABLE III

PLOT LOSSES

Lassen National Forest

PER SECTION BASIS

UNIT	Timbered: (*) Acreage	1933 Losses: Per Section: Trees	1933 Losses: Per Section: Vol. B.M.	1933 Losses: Per Unit: Trees	1933 Losses: Per Unit: Vol. MBM	1934 Losses: Per Section: Trees	1934 Losses: Per Section: Vol. B.M.	1934 Losses: Per Unit: Trees	1934 Losses: Per Unit: Vol. MBM	1935 Losses: Per Section: Trees	1935 Losses: Per Section: Vol. B.M.	1935 Losses: Per Unit: Trees	1935 Losses: Per Unit: Vol. MBM
Willow Springs	51,750	210	170,000	16,970	13,735	256	176,706	20,698	14,448	244	216,155	19,727	17,476
Dixie Valley	55,340	211	213,470	18,243	18,465	316	361,255	27,321	30,370	205	162,300	17,724	14,032
Slate Mtn.	35,225	153	148,170	8,415	8,149	211	238,780	11,611	15,030	200**	195,600	11,006	10,654
Gordon Creek	7,030	81	79,030	283	861	114	85,160	1,249	934	133	51,392	1,458	563
Cave Mtn.	10,200	103	81,570	1,770	1,403	184	150,780	3,159	2,245	129	88,750	2,146	1,524
Brockman Flat	12,670	128	64,060	2,495	1,268	275	166,700	5,442	3,299	200**	121,200	3,958	2,399
Logan Mtn.	6,144			NO	REST	IMATES							
Crater Mtn.	14,272	57	59,430	1,271	1,325	110	108,140	2,453	2,412	149	122,400	3,325	2,730
Harvey Mtn.	13,840	134	124,830	2,894	2,696	233	311,080	5,057	6,726	195	219,650	4,216	4,749
Cone Mtn.	38,000	151	144,100	8,954	8,545	207	215,540	12,290	12,797	160	141,970	9,499	8,429
Bozard	19,800	40	67,990	1,726	2,101	103	92,700	3,166	2,257	116	104,400	3,528	3,229
Butte Creek	56,280	32	70,540	2,813	6,183	87	76,300	7,651	8,886	95**	88,200	8,619	7,797
Totals	321,541			65,951	64,732			100,097	96,014			85,254	75,542

* As of 1933

** Based upon reconnaissance only

Figure 1 - The infested trees shown (light foliage) are part of a group of 25 trees attacked by the second 1935 generation of the western pine beetle near Pat Morris Spring. The upper bole of some of the trees undoubtedly have been attacked by the second generation of beetles, while the basal portions have filled in with third generation beetles of the 1935 brood.

Photo taken September 5, 1935 by K. A. Salman

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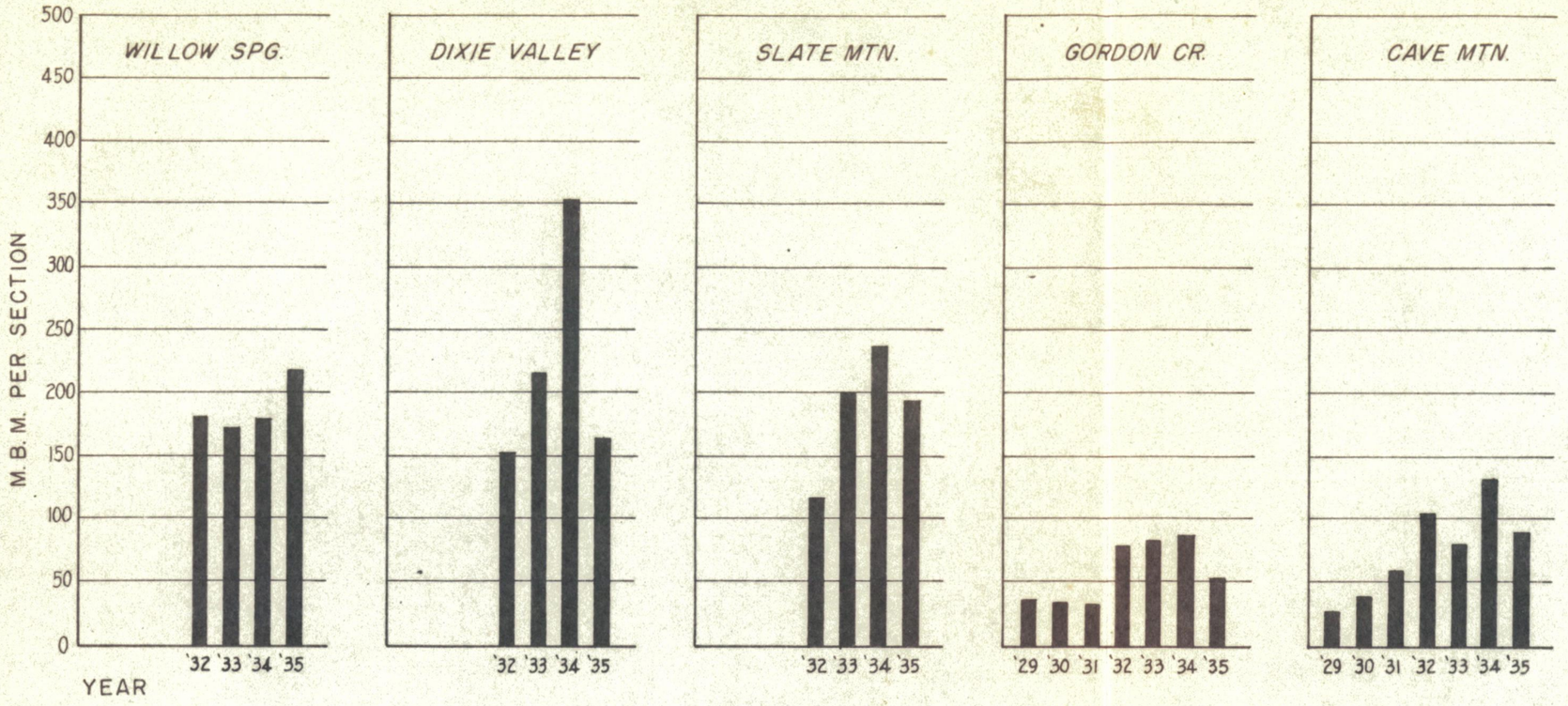
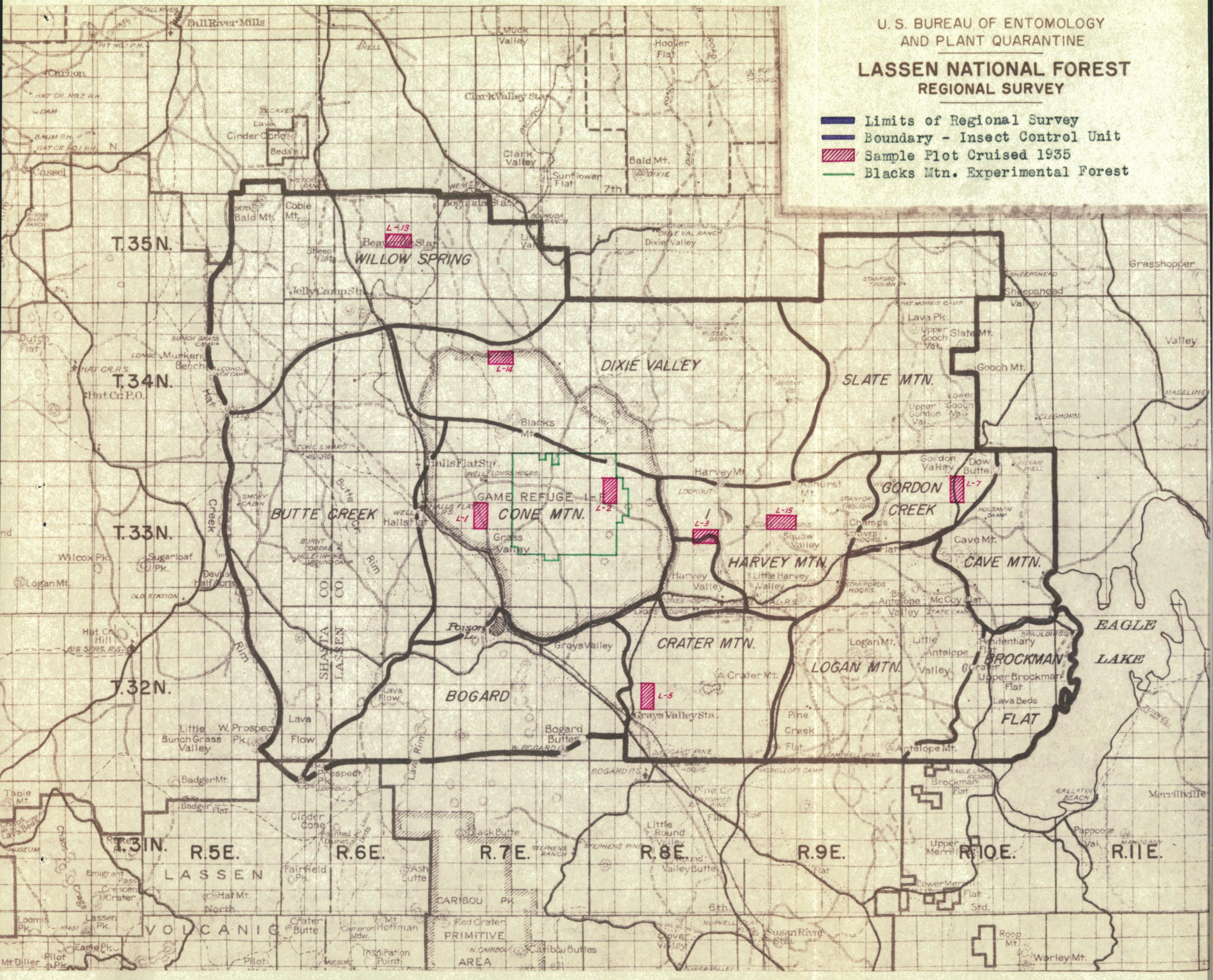
INSECT LOSSES
LASSEN NATIONAL FOREST, CALIFORNIA
1929 - 1935

ANNUAL M.B.M. LOSSES PER SECTION BY UNITS

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LASSEN NATIONAL FOREST
REGIONAL SURVEY
Limits of Regional Survey
Boundary - Insect Control Unit
Sample Plot Cruised 1935
Blacks Mtn. Experimental Forest
T.35N.
T.34N.
T.33N.
T.32N.
T.31N.
R.5E.
R.6E.
R.7E.
R.8E.
R.9E.
R.10E.
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L-7
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L-15
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DIXIE VALLEY
SLATE MTN.
GORDON CREEK
BUTTE CREEK
CONE MTN.
GAME REFUGE
HARVEY MTN.
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LOGAN MTN.
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Cassel
Hat Cr. P.O.
Blacks Mtn.
Harvey Mt.
Gooch Mt.
Slate Mt.
Grasshopper
Sheepshead Valley
Dixie Valley
Clark Valley
Muck Valley
Hoover Flat
Sunflower Flat
Bald Mt.
Cinder Cone
Lava Beds
Grass Valley
Harvey Valley
Little Harvey Valley
Squaw Valley
Antelope Valley
McCoy Flat
Gray's Valley
Logan Mt.
Crater Mt.
Antelope Mt.
Lava Pk.
Upper Gooch Val.
Lower Gooch Val.
Upper Gordon Val.
Gordon Valley
Dow Butte
Champs Flat
Cave Mt.
Little Antelope Valley
Upper Brockman Flat
Lava Beds Flat
Pine Creek Flat
Brockman Flat
Lower Merrill Flat
Upper Merrill Flat
Merrillville
Pappoose Val.
Halls Flat
Halls Flat Sta.
Grays Valley Sta.
Dixie Val. Ranch
Bogard Buttes
Badger Mt.
Badger Flat
Little W. Prospect
Bunch Grass Valley Pk.
Lava Flow
Cinder Cone
Black Butte
Little Round Valley Butte
Fairfield Pk.
Ash Butte
Hat Mt.
Caribou Pk.
Caribou Buttes
Red Cinder
Crater Butte
Cameron Mdw.
Hoffman Mt.
Inspiration Point
Susan River Sta.
Roop Mt.
Worley Mt.
Table Mt.
Loomis Pk.
Lassen Pk.
Eagle Pk.
Pilot Pk.
Mt. Diller
Emigrant Pass
Crescent Crater
Chaos Crags
Chaos Lake
Dutch Flat
Munkers Bench
Wilcox Pk.
Sugarloaf Pk.
Devils Half Acre
Logan Mt.
Hat Cr. Hill
Poison L.
Rim
Lava Rim
Butte Creek
Hat Creek
Shasta
Lassen
Co
Co
Jelly Camp Sta.
Beaver Slide Sta.
Bogard Pine
Campbell Pine
Stephens Pine
Stephens Ranch
Bogard R.S.
Big Sprs. R.S.
Hat Cr. R.S.
Longs Hdqrs.
Stanford Hdqrs.
Stoves Hdqrs.
Jones Hdqrs.
Lookout
Old Station
Burnt Corral
Hole-in-the-Ground Camp
Smoky Cabin
Bunch Grass Camp
Falcon Hill Camp
Cone & Ward's Camp
Pat Morris Camp
Stanford Trough
Russel Dairy
Bogard Ranch
Rising River Ranch
Baum P.H.
Hat Cr. No. 1 P.H.
Hat Cr. No. 2 P.H.
Pit No. 1 P.H.
Shell
Pacific
Dixie
Western
Sheep Wash
Jessen Val.
Lower Val.
Madeline
Cleghorn
Indian Well
Lookout
Stanford Trough
Holesman Camp
Shaulding's
Penitentiary
Eagle Lake Resort
Gallatin Beach
Mahogany
Pine Cr. Hdqrs.
Mc Guillop's Camp
Norvell
Clover Valley
Lower Val.
Flower Valley
6th
7th
Dam
Ditch
Road
Trail
Lava Tubes
Wells
Spring
Lookout

A P P E N D I X

1934 Unit Losses

Willow Spring:

Average of six sections treated in Little Valley unit (Halls Flat Control Project, 1934-35), 525 trees. Estimated loss for L-13 (90 trees) and L-6 (153 trees) taken from Lassen Survey Report of November 20, 1934. Estimate loss as follows:
525 plus 90 plus 153 divided by 3

Dixie Valley:

L-14; reduce 25% for unit loss figure

Gordon Creek:

L-7; use plot loss direct for unit loss

Crater Mtn.:

L-5; use plot loss direct for unit loss

Harvey Mtn:

L-3; 50% L-15; 50%

Cone Mtn.:

L-1; 66 2/3 %; L-2; 33 1/3 %

Bogard:

1934 loss (est.) from 1934 Lassen survey report but reduce volume to 900 B. M. per tree for 103 trees

Butte Creek:

1934 loss (est.) from 1934 Lassen survey report

Brockman Flat:

Same as for Butte Creek unit

Cave Mtn:

Same as for Butte Creek unit

1935 Plot Estimates

Use cruise figures from all plots cruised in 1935 as 70% of total seasonal loss.

A P P E N D I X (Continued)

1935 Unit Estimates

Willow Creek:	L-13 x 3 L-14 x 1	Divide by 2
Dixie Valley:	L-14 x 2 Slate Unit Figure x 1	Divide by 4
Gordon Creek:	L-7 less 20%	
Crater Mtn.:	L-6 x 1	
Harvey Mtn.:	L-3 x 1 L-15 x 2	Divide by 3
Cone Mtn.:	L-1 x 2 L-3 x 1	Divide by 3
Bogard:	Increase 1934 unit figure by 13%	
Butte Creek:	Increase 1934 unit figure by 13%	
Brockman Flat:	Based upon reconnaissance figures	
Cave Mtn.:	Based upon reconnaissance figures	
Slate Mtn.:	Based upon reconnaissance figures	

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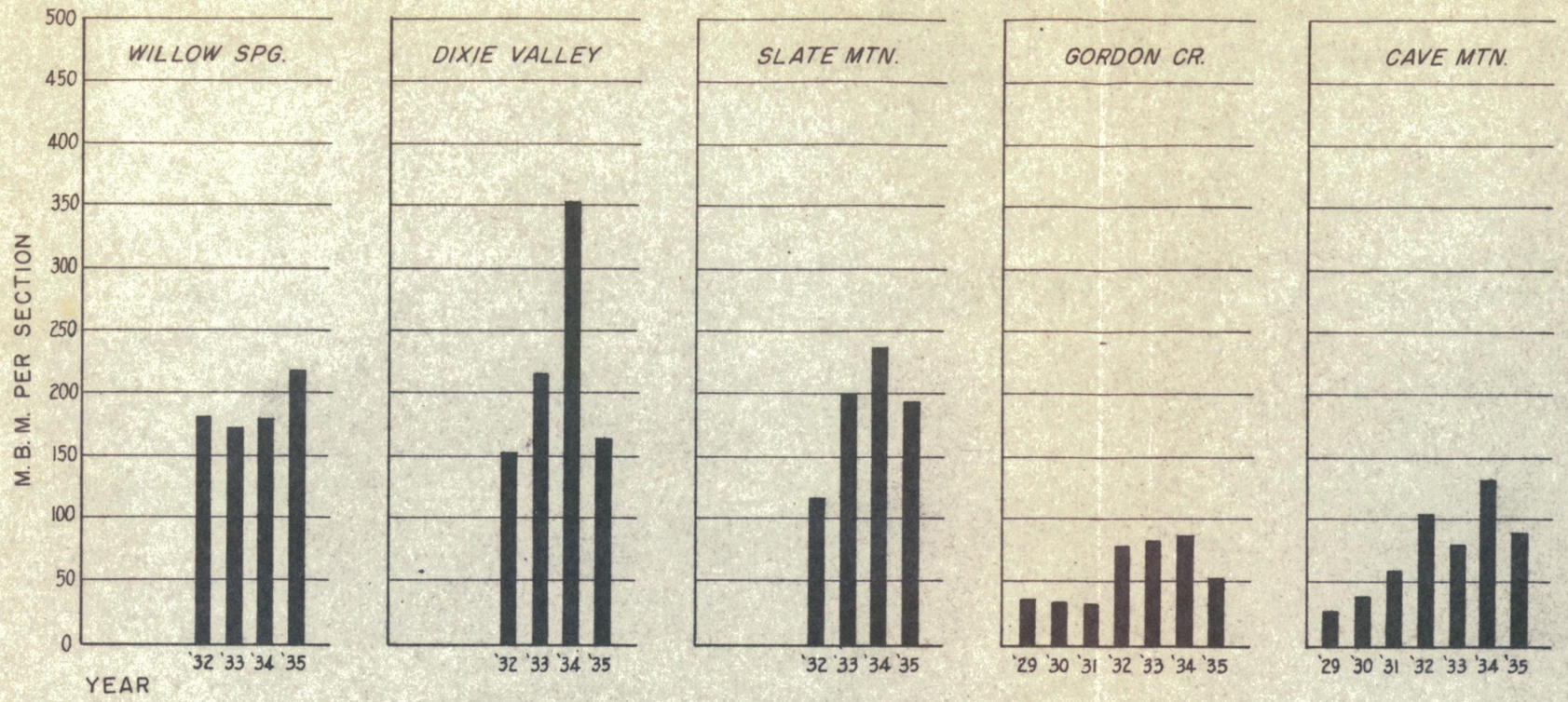
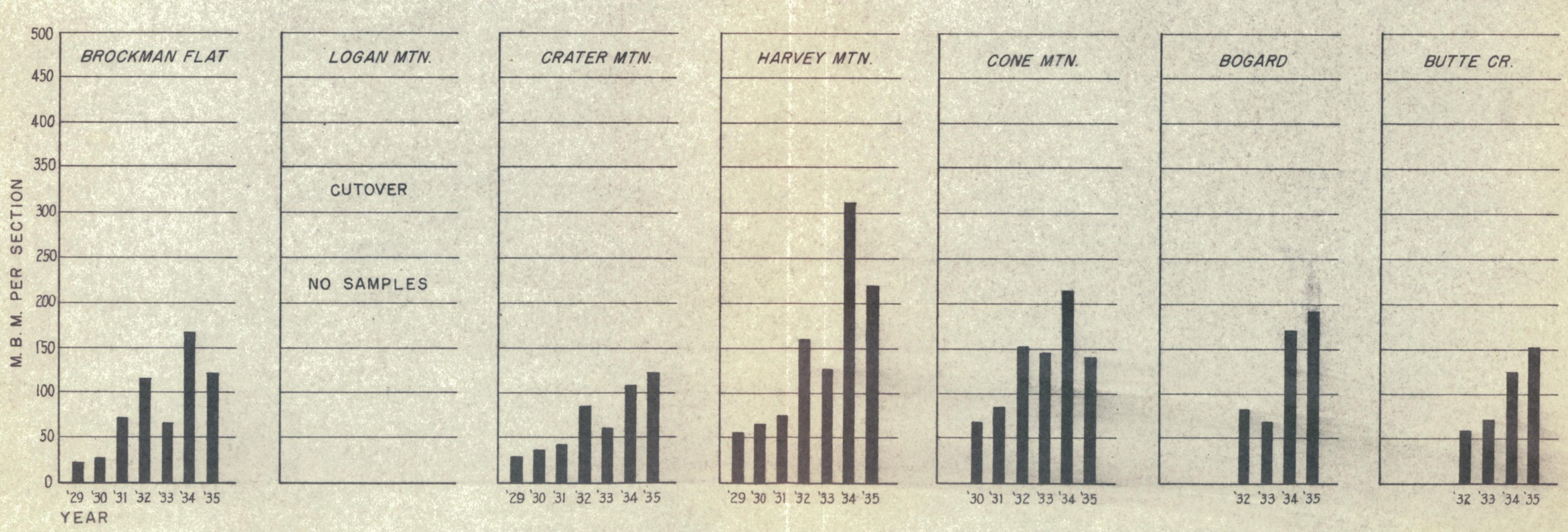
INSECT LOSSES

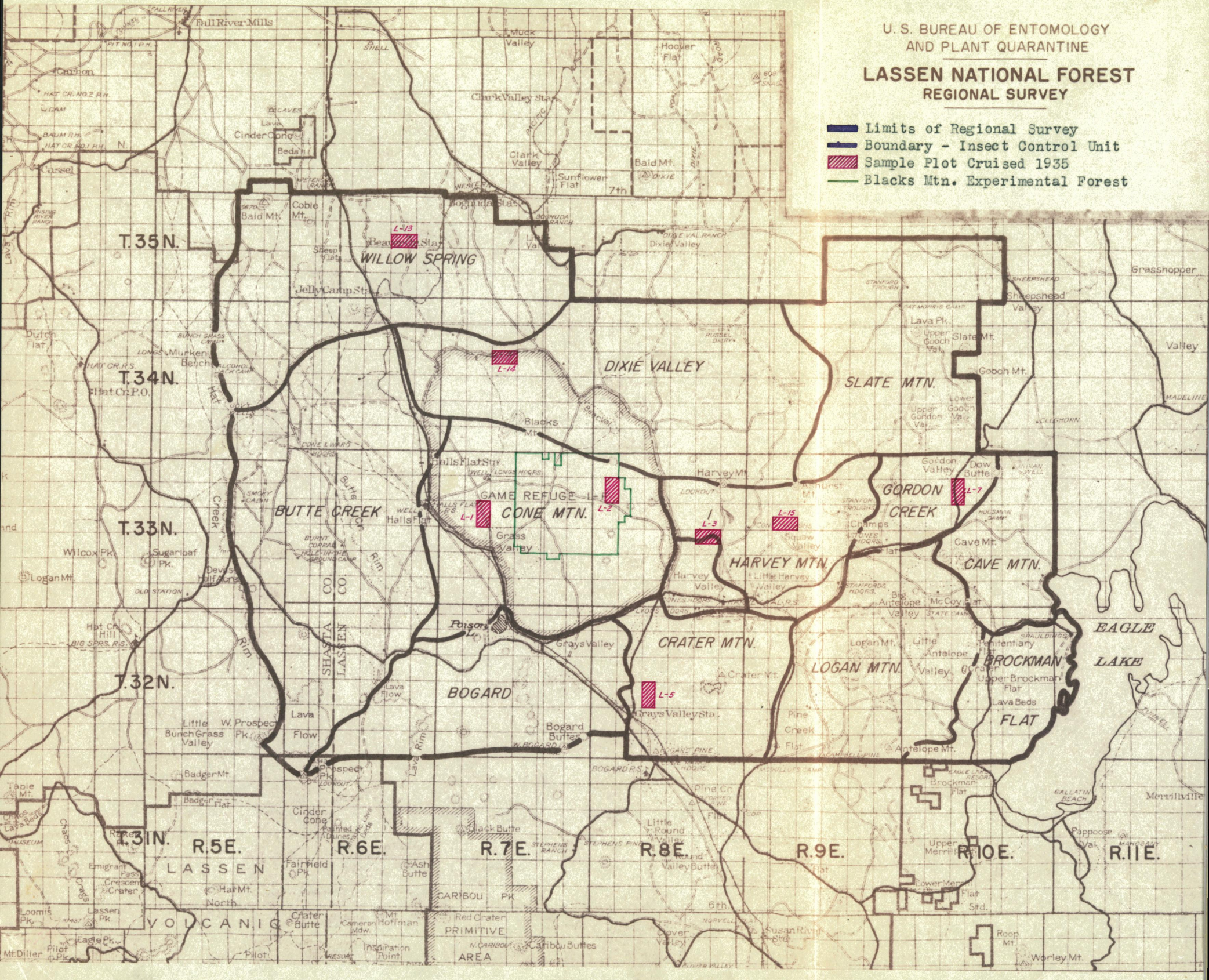
LASSEN NATIONAL FOREST, CALIFORNIA

1929 - 1935

ANNUAL M.B.M. LOSSES PER SECTION BY UNITS



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Bogard Sta.
Beaver Sta.
Jelly Camp Sta.
Dixie Valley
Grasshopper
Sheepshead Valley
Lava Pk.
Slate Mt.
Gooch Mt.
Dutch Flat
Murken Bench
Flat Cr. P.O.
Blacks Mt.
Halls Flat Sta.
Halls Flat
Grass Valley
Harvey Mt.
Gordon Valley
Dow Butte
Champs
Cave Mt.
Wilcox Pk.
Sugarloaf Pk.
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Devils Half Acre
Hat Cr. Hill
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Grays Valley
Grays Valley Sta.
Harvey Valley
Little Harvey Valley
Big Antelope Valley
McCoy Flat
Little Antelope Valley
Penitentiary Flat
Upper Brockman Flat
Lava Beds Flat
Antelope Mt.
Little W. Prospect Pk.
Bunch Grass Valley
Lava Flow
Bogard Buttes
Badger Mt.
Badger Flat
Prospect Pk.
Taple Mt.
Cinder Cone
Black Butte
Little Round Valley
Round Valley Butte
Pine Creek Flat
Brockman Flat
Merrillville
Pappoose Val.
Emigrant Pass
Crescent Crater
Hat Mt.
North
Fairfield Pk.
Ash Butte
CARIBOU PK
Loomis Pk.
Lassen Pk.
Crater Butte
Cameron Mdw.
Mt. Hoffman
Red Crater
N. CARIBOU
Caribou Buttes
Mt. Diller
Pilot Pk.
Eagle Pk.
Pilot
Inspiration Point
Susan River Std.
Roop Mt.
Worley Mt.

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INSECT LOSSES
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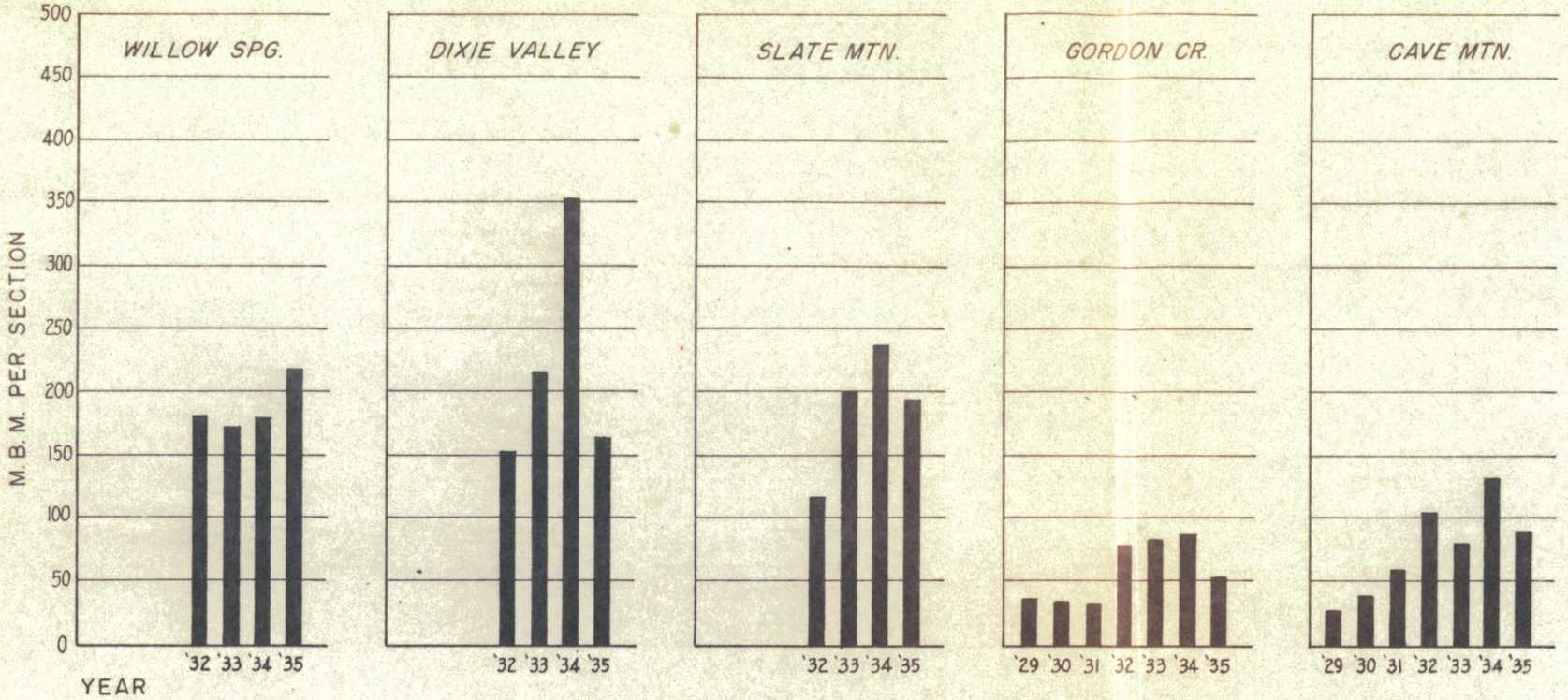
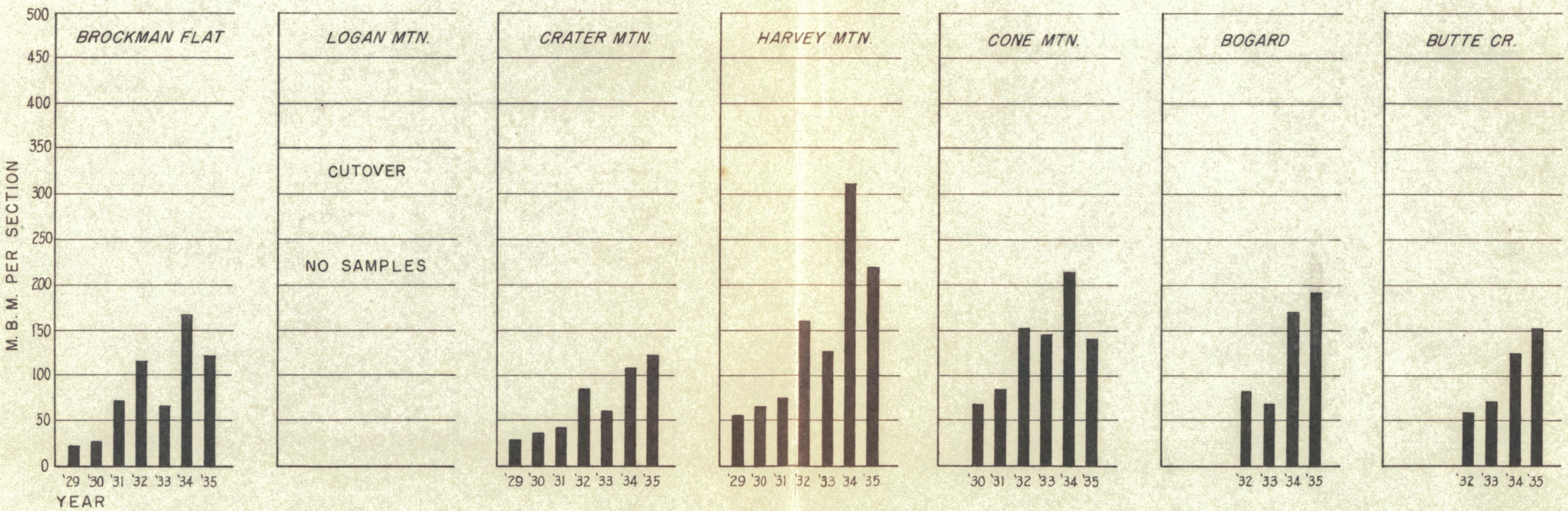
1929 - 1935

ANNUAL M.B.M. LOSSES PER SECTION BY UNITS





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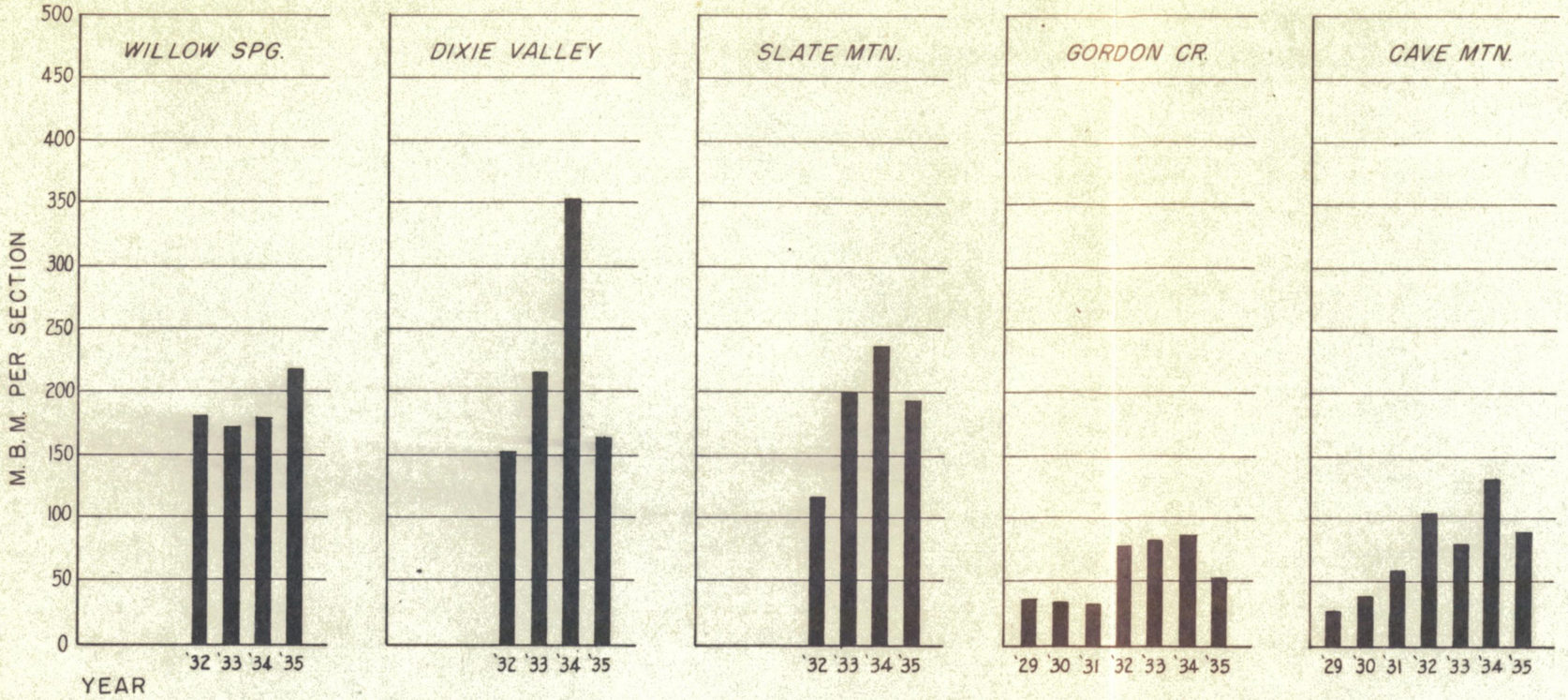
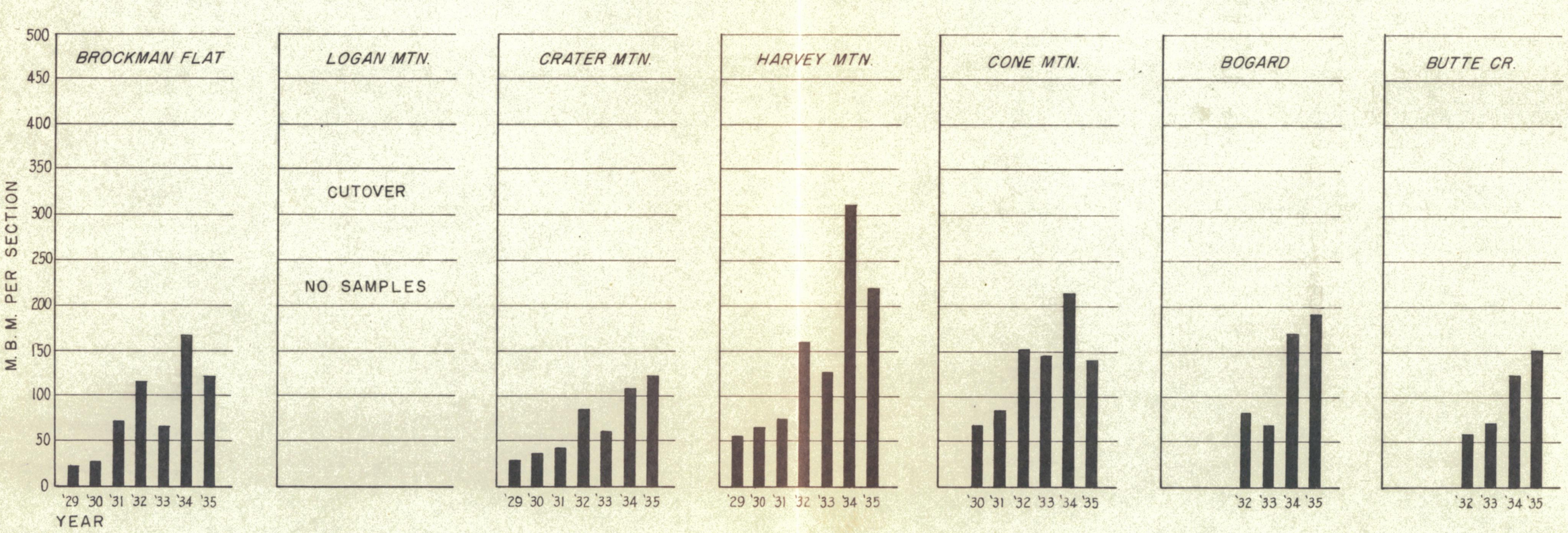
INSECT LOSSES
LASSEN NATIONAL FOREST, CALIFORNIA
1929 - 1935

ANNUAL M.B.M. LOSSES PER SECTION BY UNITS